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European Commission, Directorate-General Climate Action
Attn.: Unit CLIMA.A.4: Strategy and Economic Assessment

B-1049 Bruxelles
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Response to public consultation - Roadmap for a low carbon economy by 2050

- **Affordability has to be a key dimension of any EU roadmap towards a low-carbon economy. Statoil believes in a gradual, cost-effective transition to 2050 in which new technologies are increasingly applied when they have matured and can be picked up by the market. The future is now, however, and we see no contradiction between immediate action and gradual transition.**
- **Natural gas offers an attractive, optimised pathway to 2050 for a Europe seeking to reduce its CO2 emissions by 80-95% while strengthening its competitiveness and enhancing its energy security. In the short term, natural gas can contribute to decarbonisation through fuel switching, especially by replacing coal with gas in power generation. In the medium term, natural gas is a good match for renewables as a complement to intermittent wind and solar energy. In the long term, natural gas with CCS promises to be a destination fuel for the power sector.**
- **The IEA confirms that it is not possible to achieve EU or global CO2 reduction targets without CCS. This is why Statoil welcomes the EU's continued commitment to carbon capture and storage. CCS has its natural place in a portfolio of prospective low-carbon technologies and these technologies need to be supported by public funding through the demonstration phase.**
- **It is important that the EU continues to develop the power grid in Europe. Without a strengthening and further integration of the grid it can become a bottleneck for the efficient development of new power generation from intermittent renewables. Integration and interconnection are particularly important for the development of offshore wind resources and in order to ensure market stability for both consumers and producers.**

Statoil is an international energy company with operations in 34 countries and is the second largest supplier of natural gas to Europe. We are a pioneer within CCS and currently operate some of the world's largest projects in this area. Statoil is gradually building a portfolio within renewable energy production, with the strongest focus on offshore wind. We welcome this opportunity to provide input to the development of a roadmap for a low carbon economy by 2050.

Statoil acknowledges that emissions of greenhouse gases are a major challenge, and we believe that a coordinated and powerful effort by governments, businesses and individuals is required to combat climate change. At the same time we acknowledge that any solutions to reduce GHG emission must also be balanced towards security of energy supply and costs Statoil commends the EU's pioneering role as a front runner in implementing new policies and establishing ambitious targets for emissions reductions both for the short and long term.

The EU 2050 ambition requires immediate action and a gradual transition

The scale of the challenge of reaching the EUs 2050 ambition requires not only a deliberate strategy for development and use of new energy technologies, but also a strategy for the energy resources one bases energy supplies on. A strategy for reaching the EU's 2050 ambition requires immediate action, but should allow for the most cost efficient reduction measures and a secure, affordable supply of energy. Statoil observes that the different scenarios that have been developed entail high technology development and energy supply risk. Statoil believes that it will be very challenging to realise EU's 2050 ambition primarily based on renewable energy production and energy efficiency, while at the same time securing a stable supply of energy and maintaining the EU's competitiveness. A diversified energy portfolio is needed to meet both climate and energy security challenges.

Natural gas delivers immediate emissions reductions

Statoil sees natural gas as an urgent, available and critical measure on a sustainable pathway for a Europe seeking to maintain and strengthen its competitiveness, enhance its energy security and reduce its CO2 emissions. As such it is important that natural gas is properly reflected in any future strategy documents. According to the IEA 2010 outlook, globally there are significant supplies of natural gas available, allowing for current global gas demand to be met for 250 years. The development of shale gas in the US has eased the security of supply situation in the US. As a consequence greater supplies could be made available to the EU. Coupled with further focus and development of European shale gas the EU could have access to comfortable supplies of natural gas, further enhancing long term supply security.

Today, coal fired power plants account for the major share of emissions from power production within the EU. Replacing coal by natural gas in power generation is an immediate and affordable way to reduce Europe's CO2 emissions, as it could reduce CO2- emissions from old coal-fired power plants by 70 percent. Compared to new state-of-the-art coal-fired plants, gas-fired power plants will cut emissions by a half. Natural gas is a cost competitive fuel, which is available now and will provide secure supply of energy in the long term.

Gas-fired power plants apply established technology and require short construction time. Importantly, natural gas provides the flexibility needed in a generation mix with a large share of intermittent renewable energy production. Thus, gas-fired power plants are essential to balance power systems increasingly dependent on wind and other intermittent renewable energy production. Statoil believes that the combination of natural gas and wind power could quickly deliver large reductions of emissions from power production. In the longer term perspective CCS is required on gas-fired power plants to achieve the EU's 2050 ambition.

A comprehensive analysis[1] instigated by members of the European Gas Advocacy Forum where Statoil participates, shows that Europe can reach its ambitious mid-term 2030 target at a 400-500 billion Euros lower costs from 2010-2030 compared to a more expensive pathway where renewable energy would make up 60 per cent of Europe's power sector or energy mix in 2050. The low-cost scenario, called the "Optimised Pathway", can be reached by lowering coal-fired production and postponing the bulk of large-scale implementation of more expensive CO2-friendly technologies to later years when they will be more affordable and reliable. The decisions regarding 2050 technology mix could be made by 2025-2030, once there is a better understanding of the potential and costs of each technology and allowing for the market to deliver new technologies. This "Optimised Pathway" entails a higher utilization of gas plants against lower utilization of more polluting technologies. In such a scenario renewable energy would make up slightly over 40 per cent of the energy

[1] The detailed analysis will be presented and made available for the European Commission in meetings scheduled for December 2010 and January 2011.

mix in 2050. The "Optimised Pathway" would be straightforward to implement from a technical perspective as it is largely based on existing plans and technologies.

On a high level, the "Optimised Pathway" generates the following benefits:

- **CO2 abatement.** The optimised scenario reduces economy-wide CO2 emissions every year, reaching minus 80% in 2050. Especially in the earlier years it does so by making smarter use of existing assets: a higher utilization of gas plants against a lower utilization of more polluting technologies.

- **Lower total costs.** The "Optimised Pathway" achieves the carbon abatement at attractive total costs. For the first 20 years, total costs in the power sector are €400-500bn lower, and potentially up to an additional reduction of € 200bn in the 2030-2050 period, compared with the ECF Roadmap 2050 60%-RES pathway. Compared with the IEA WEO 2009 "Reference case" total power costs (excluding CO2 costs) will be up to € 50bn lower in the 2010-2030 period.

- **Lower investments.** The "Optimised Pathway" requires about €400-550bn less capital expenditure compared with the ECF Roadmap 2050 60%-RES[2] (power sector) in the 2010- 2030 timeframe. This corresponds to €50-200bn more capital expenditure compared with the baseline, which does **not** abate CO2 beyond 2020. In the 2030-2050 timeframe, a possibility might exist to avoid a further € 400-550 bn capital investments compared with the ECF Roadmap 2050 60%-RES, although this could be offset by implementation set-backs or other unforeseen costs.

- **Lower energy bills and better competitiveness.** Compared with 60%-RES pathway, investment savings in Power Generation amount to ~€ 150-250 per European household. The energy intensive industries could avoid a decline of ~5-10% of their profit margin through higher energy bills, improving the competitiveness of the energy intensive industries and thereby the job security of the 20-25mln people employed in these industries in Europe.

- **Security of the energy system.** The power system would be robust as it would have a large share of reliable generation, and not be dependent on increasingly intensive international collaboration or additional international power transmission lines. With regards to availability of natural gas, total demand for gas would be roughly equal to today. Due to a continued growth of supply sources, including LNG, Europe will be more resilient against any potential default of any individual player than ever before.

- **Ease of implementation.** Through its use of mature and dispatchable technologies, the "Optimised Pathway" is less reliant on technological developments, transmission build-out,and overcoming the corresponding societal concerns. Also, it does not require, at least for the first decades, the same level of internationally aligned planning and operation of the power system.

Statoil believes that achieving a sustainable path towards a low carbon EU economy can only be achieved through a gradual transition and change in the production and use of energy. Increased use of natural gas, especially in the power generation sector, will deliver immediate emissions reductions and energy security. In the medium to long term, increasing renewable energy production, and facilitating development and implementation of CCS related to power production and other industries, are necessary measures for realizing a low carbon economy by 2050.

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[2] Renewable Energy Sources

It is essential therefore that the EU uses this opportunity to signal a positive message to companies who would seek out, develop, produce and deliver these new volumes, as the timescales we operate under in this industry already bring us close to the end of the EU's vision. Further investment is required to develop these gas resources around the world and the knowledge that one of the main global gas markets still values the contribution of gas in its energy mix is vital to sustain this effort. Statoil would see a positive message on the future role of gas within the EU's roadmap as a strong incentive to continue to find ways of developing and delivering gas to one of our core markets.

Extended use of CCS related to power production and industry emissions is required

Statoil believes that wide deployment of Carbon Capture and Storage (CCS) is one necessary measure to reduce GHG emissions from power production and other industries. Statoil is regarded as a front runner within CCS and currently operates some of the world's largest projects in this area. Statoil is now taking one step further by building CO2 Technology Centre Mongstad – in cooperation with Norwegian Government, Shell and Sasol. The CO2 Technology Centre Mongstad is scheduled to start up in 2012, and is an example of fruitful public private partnership which we believe will be of great importance for wide deployment of CCS. The goal of the technology centre is to further develop and test various technologies relating to carbon capture from exhaust gases from the combined heat and power plant, and from emission sources at the refinery. Such technologies should also be applicable for capturing CO2 from other sources.

A rapid deployment of CCS raises many issues with regard to financing of demonstration projects, implementation of regulatory issues and also incentives for further investments in CCS. The main long term objective of CCS is to become a competitive tool for reducing GHG emissions, i.e. that the cost of CCS meets the carbon price. To achieve wide deployment of CCS in the longer term perspective an appropriate and reliable regulatory and financial framework is required to provide investor confidence. In the short term perspective such mechanisms would primarily involve public funding, as CCS technology is currently at an early demonstration phase and not yet commercially viable. Statoil supports the present EU policy on CCS, as the single most important issue at present is to get the planned CCS demonstrations built as quickly as possible. However, given the significant incremental capital cost for a single CCS project, the current funding mechanisms may not be sufficient to achieve demonstration and rapid deployment of CCS. Additional measures are required to speed up development and commercialisation for CCS in the short term.

Establishment of new CCS value chains requires large investments in infrastructure. We must expect in the future that there might be long distances between the respective capture facilities and storage sites of CO2. The EU should have a special role in the planning and in financially supporting long distance cross border transportation systems.

Statoil would like to emphasise that an immediate transition from coal to gas would allow the EU to provide sufficient time for the development of CCS to decrease the costs, improve the commercial viability and obtain widespread implementation of CCS from 2020 and onwards. As the cost of capturing CO2 per amount of energy generated could be lower for gas-fired power plants compared to coal-fired power plants, natural gas could have a superior fit with CCS compared to coal. A combined approach by immediate fuel-switching from coal to natural gas and widespread implementation of CCS in the longer term perspective provides the most realistic and cost efficient path to achieve large reductions towards 2050.

Offshore wind power production

Offshore wind has the potential to be an important contributor to the low carbon economy as Europe has significant offshore wind resources. It is currently not yet a mature industry, and needs to have strong focus on bringing cost of offshore wind down. Statoil has initiated an internal program on this issue which is addressing both technological,

operational and supplier market challenges. We are confident that systematic and long term dedicated efforts by the industry to reduce costs will eventually make offshore wind competitive.

Offshore wind is currently dependent on support from national governments and the EU. It is important that the economic support reflects the maturity of the technology to stimulate development of technologies with potential for large scale and cost efficient deployment. The development of new renewable energy sources may require investments in the power grid to secure efficient markets and supplies to the consumers. A lack of development of the power grid can become a bottleneck for an efficient development of new intermittent renewable generation. It is therefore important that EU continue to focus on strengthening and integration of the power grid in Europe. Ensuring that countries and regions in Europe are interconnected is crucial to facilitating an efficient utilisation of the offshore wind resources and to ensure the necessary market stability for producers and consumers.

Geothermal energy

Statoil is also screening geothermal energy as a potential business opportunity. Geothermal represents a potential base load energy source which should contribute towards a low carbon economy. Our recommendation is that the Roadmap 2050 also should focus on how geothermal business can be built in Europe, including the future potential of engineered geothermal systems (EGS) in hard, dry rock.

EU Emission Trading Scheme should remain the main instrument for curbing emissions

Statoil supports a high global price on CO2 and sees the EU Emission Trading Scheme (EU ETS) as the main instrument for cost efficient GHG reductions in the EU, both in the short and long term perspective. The EU ETS provides the most effective measure to deliver targeted GHG reductions, and at the same time provides a predictable framework for the industry in the long term, rewarding the most carbon efficient solutions.

However, Statoil fully recognises that the EU ETS does not currently provide sufficient investment incentives for development and demonstration of new low carbon technologies. Additional measures must be established to push renewable technology development and make renewable energy production economic viable. Similarly, additional measures are required to speed up development and commercialisation of CCS in the short term. When considering new measures and regulations in addition to the EU ETS, potential consequences must be carefully assessed. As an example, emission performance standards (EPS) related to power production is one measure that is being discussed. Statoil is concerned that commercialisation of CCS technology will be negatively affected by EPS, as industry would be exposed to the full cost and risk of CCS before the technology is commercially available. It is reasonable to expect EPS to have large detrimental effects on investments in new power production, as few investors will be able to take on projects faced with the risks of employing technologies that are not technologically and commercially mature. Thus, measures additional to the EU ETS to push development and demonstration of new low carbon technologies will primarily involve public funding.

Linking of EU ETS to other emissions trading systems and to develop international carbon markets

The EU is a pioneer in developing and implementing policies to reduce its GHG emissions. The EU should continue its pioneering role through facilitating development of emissions trading systems outside the EU. Expanding the geographical scope of the EU ETS is welcomed by the industry, as it would contribute to lower the costs of reducing emissions and creating a more harmonised framework for industry within and outside the EU. Expanding the EU ETS would increase the effectiveness of the system, and will potentially be a step towards global pricing of CO2.

Also, it is of great importance that the EU continues to allow for use of flexible mechanisms such as the Clean Development mechanism also in the future. This would allow for stricter emission cap within the EU without putting too

large constraints on the industry, and at the same time facilitate transfer of sustainable technologies to developing countries.

Need for predictable long term framework to provide investor confidence

Statoil, as a large provider of natural gas, investor in renewable energy and seeking business opportunities in carbon storage, recognises the need for long term predictable and harmonised framework in order for business to make investments. Regulatory stability is crucial to achieve the desired investments in low carbon technologies and energy use.

The EU ETS combined with additional support measures to facilitate development, demonstration and implementation of specific technologies, would allow the industry to make long term investments in low carbon solutions.

There are many pathways to achieve the EU's climate ambitions in 2050 and it is important that policy developers should understand and debate how best to achieve these aims. Statoil believe that through a combination of existing, affordable gas fired generation, renewable energy and the deployment of CCS, the EU can meet its ambition. This scenario allows for greater flexibility in technology and market mechanisms to deliver what is an ambitions goal. Statoil appreciates the opportunity to convey our opinion in this regard and we remain available for any further discussions on this matter.

Kind regards

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